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ABSTRACT

This study was designed to investigate the influence of the visual display of an instructional design model on preservice teachers' perceptions of the instructional design process. It sought to discover whether the use of curves or angular organization, and flexibility of that model. Subjects were 36 undergraduate education majors enrolled in an introductory education class at a 4-year university. Students were first assessed on their initial knowledge and perceptions of the instructional design (ID) process. Students were then given a 3-hour introduction to ID. Afterwards, their perceptions were assessed again. Students viewed first one and then the second of two visual depictions of the Smith-Ragan ID model. One was drawn with curved lines and ovals and the other was formed with straight lines and rectangles. Half of the students were given the curve/oval model first, completed the assessment, and were then given the straight/rectangle model and asked the same questions. The other half of the students were presented with the models in reverse order. Results indicated that: preservice teachers changed their responses between the pretest and posttest assessing their perceptions of flexibility, organization, and value of the ID process; the straight/rectangle model was perceived to be more organized; and a majority of the students indicated a preference for the curve/oval model as the "best model to represent the ID process" and "choice of model to use to teach the ID process." (Contains nine figures.) (AEF)

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Title:

Perceptions of the ID Process: The Influence of Visual Display

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Background and Rationale

During years of teaching principles of instructional design (ID) to graduate and undergraduate education majors, the authors have noted that, when initially presented with models that use rectangles and straight lines to visualize the process (e.g. Dick & Carey, 1990; Seels & Glasgow, 1990; Smith & Ragan, 1993), students' first impression of the ID process is that it is rigid, inflexible, fixed, and perhaps not very relevant for use in a real-world K-12 classroom. However, when students have first been introduced to Kemp's circular model (Kemp, 1985; Kemp et al., 1994), students' initial perceptions of the ID process are that the process is somewhat flexible and adaptive and may be beneficial to them as teachers. Kemp himself indicates (Kemp, 1985, p. 12; Kemp et al., 1994, p. 10) that his choice of a circular model was chosen to visually emphasize the flexibility of his approach to instructional design.

From the perspective of visual communication, vertical and horizontal lines, squares, and blocks are associated with feelings of stability and stasis while circular forms and curved lines imply movement, motion, and dynamism (Dondis, 1973; Heinich, Molenda, & Russell, 1993). If, when working to encourage teachers to use an instructional design model as a flexible framework for designing good instruction and not as a lock-step, rigid format to be followed without integrating one's own professional expertise, then the manner in which an instructional design model is visually depicted becomes an important instructional consideration. Students' perceptions of the instructional design process itself may be heavily influenced by the way in which ID models are visually depicted.

In thinking about students' potential perceptions of both the process of instructional design and the models used to visualize it, the authors identified three factors of primary interest: flexibility, organization, and value. Flexibility, used in the context of this study, is the characteristic of the ID process or model that indicates the degree to which it is responsive to being adapted or changed. Organization, as defined by the authors, is the characteristic of the ID process or model that indicates the manner of relationship among the process/model elements, the overall structure and pattern of the process/model, and the logic, meaning, and clarity of that pattern. Value is the characteristic of the ID process or model that indicates the degree of usefulness or importance.

This is the seminal investigation in a planned series of investigations and, as such, the major goal was to determine if the way in which the instructional design process is visually depicted by a two-dimensional model influences preservice teacher perceptions of the flexibility, organization, and value of the ID process itself.

Research Questions

As indicated above, this study was designed to investigate the influence of the visual display of an instructional design model on preservice teachers' perceptions of the instructional design process. The overall research hypotheses included the following:

1. Providing preservice teachers with information about the instructional design process will increase their perceptions of the flexibility, organization, and value of the process.
2. Preservice teachers will perceive the ID process to be more flexible when a curved/oval model is used to visually represent the process than when a straight/rectangle model is used.
3. Preservice teachers will perceive the ID process to be no more or no less organized when a curved/oval model is used to visually represent the process than when a straight/rectangle model is used.
4. Preservice teachers will perceive the ID process to be more valuable when a curved/oval model is used to visually represent the process than when a straight/rectangle model is used.
5. Prior experience with ID, prior experience teaching, anticipated teaching level or content, year in college, and gender will have no effect upon preservice teachers' perceptions of the flexibility, organization, or value of the ID process as visually depicted by either curved/oval or straight/rectangle models.

Additionally, the authors were interested in assessing preservice teachers' general reactions to the instructional design process. Study participants were asked to respond to the following:

6. List any other words to describe how you feel about the instructional design process.
7. Which model do you think best represents what happens in the instructional design process?
8. If you were going to teach some of the principles of the instructional design process to someone else who was planning to be a teacher, which model would you show to the other person as you explained the instructional design process?

Methodology

This study was conducted during the Fall 1995 semester following a pilot study that occurred during the Spring 1995 term. In both cases, the sample consisted of undergraduate education majors enrolled in an introductory education class at a four-year university in the Rocky Mountain west.

Figure 1. Flexibility antonym pairs

The students were first assessed on their initial knowledge and perceptions of the ID process. The assessment included a self-report of demographic and experiential characteristics including prior experience with instructional design ("none" or "some") and a 26-item, 5-point Likert-type scale on which students indicated the degree to which they felt one or the other of a particular set of antonyms described their feelings about the ID process (See Figures 1, 2, and 3). These antonym sets were categorized into three characteristic areas: flexibility, organization, and value/usefulness. Students were then given a three hour introduction to instructional design as part of a standard curriculum. During this period of direct oral instruction over the material, students received a printed outline of the "steps" in the Smith-Ragan (1993) ID model but no visual representation of the model. After instruction, students' perceptions of the ID process again were assessed using the 26-item Likert-type scale. After this posttest, students viewed first one and then the second of two visual depictions of the Smith-Ragan ID model. One model was drawn with curved lines and ovals and the other original model was formed with straight lines and rectangles. The layout, size, font styles, and other visual elements remained constant between the two models (See Figures 4 and 5).

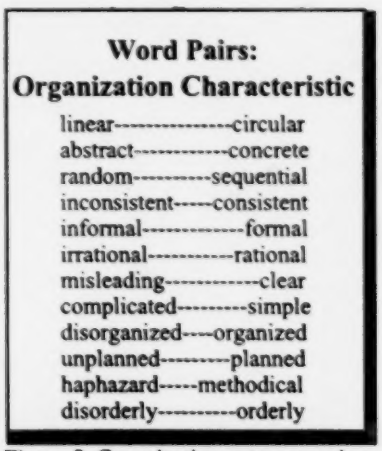


Figure 2. Organization antonym pairs

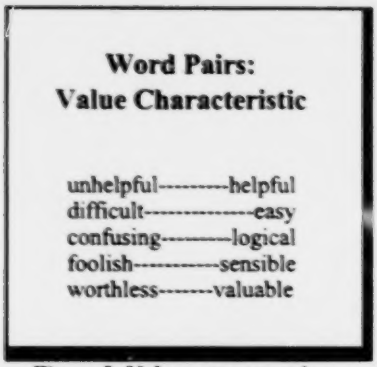


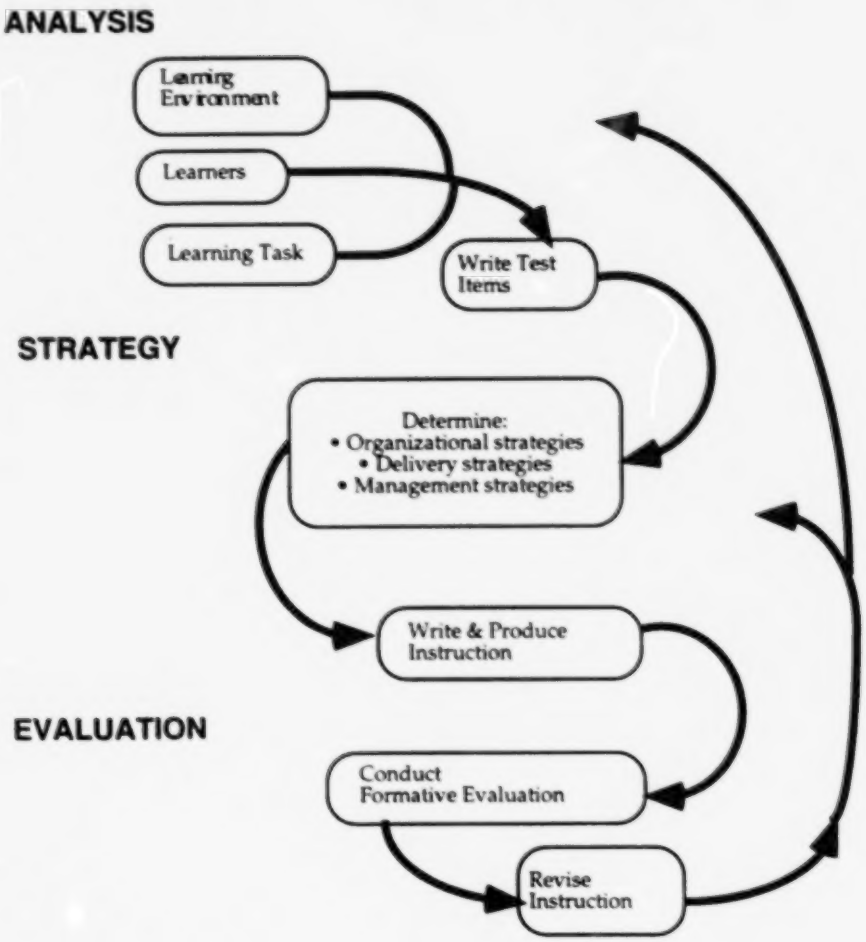
Figure 3. Value antonym pairs

During the study, half of the students were given the curved/oval model first and then completed the 26-item assessment and one question probing for any other words they associated with instructional design process. The students then viewed the straight/rectangle model and answered the same 26 response items and follow-up question while referring to the second visual. The remaining half of the students were presented with the visual models in the reverse order. After viewing both models, all students were ask to specify which model (curved or straight) best represented what "happens" in the instructional design process and which of the two models they would use if they were teaching the ID process to someone else who was planning to be a teacher.

Thirty-six (36) students participated, of which 24 (67%) were female and 12 (33%) were male. As a group, participants had completed an average of 13.92 years of schooling and represented a wide range of teaching levels and content areas. Fourteen students (39%) had taught in some capacity before, whether in a traditional classroom or as an aide, coach, community service volunteer, or religious education instructor. None had any experience with the instructional design process.

INSTRUCTIONAL DESIGN PROCESS*

Model A

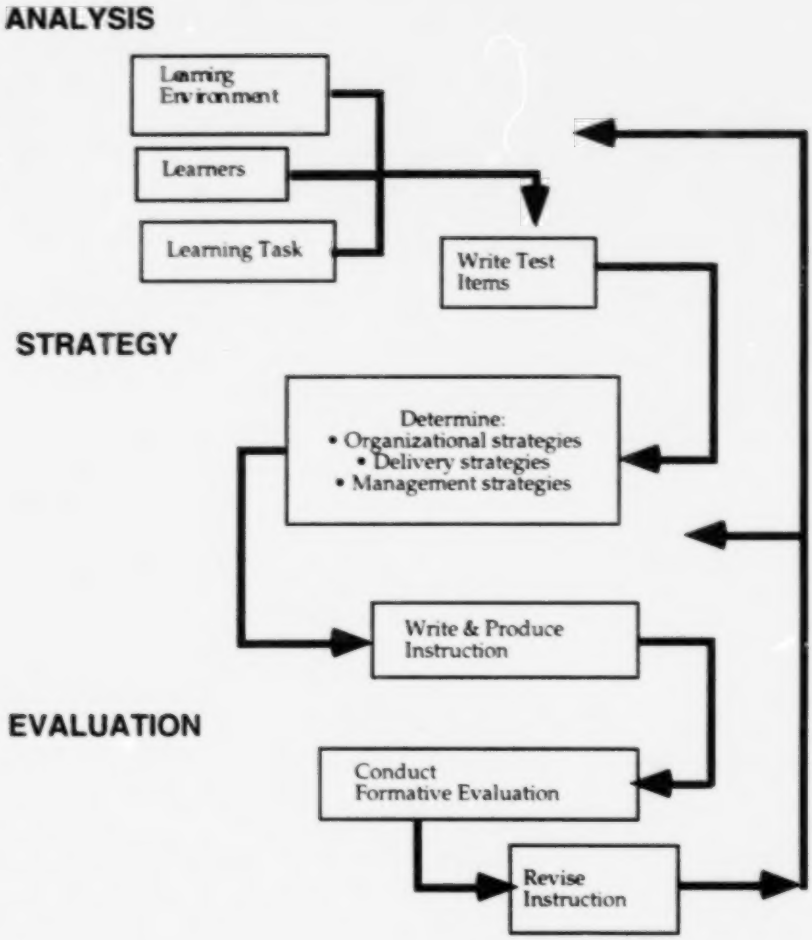


*Adapted from Smith, P. L. & Ragan, T. J. (1993) *Instuctional Design*. New York: Merrill

Figure 4. Curved/oval ID model

INSTRUCTIONAL DESIGN PROCESS*

Model B



*Adapted from Smith, P. L. & Ragan, T. J. (1993) *Instuctional Design*. New York: Merrill

Figure 5. Straight/rectangle ID model

Results

The first four research questions were examined using a paired two-sample for means t-test to indicate any change in response before and after instruction and also before and after viewing of the ID models. This test was

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significant at the .05 level for Question One. Data suggest that preservice teachers did show a change in their responses between the pretest and the posttest assessing their perceptions of the flexibility, organization and value of the instructional design process, though current data do not yet suggest where these changes occurred. On the posttest, respondents were highly consistent in choosing the terms *sensible* and *valuable* to describe the ID process. Both terms had means in excess of 4.5 on a 1 to 5 scale with the higher numeric values being associated with those two terms. Questions 2 through 4, assessing the flexibility, organization, and value of each of the two models, had varied results. Respondents found the curved/oval model to be significantly more flexible at the .05 level when it was the second model they viewed. No significant preference existed when the curved/oval model was viewed first. Participants perceived the straight/rectangle model to be more organized (significant at the .05 level) regardless of viewing order. No significant difference in the models was found regarding value/usefulness.

In regard to Question 5, the demographic and experiential characteristics selected did not satistically influence responses to any of the questions posed. Analysis of open-ended reponses also revealed no patterns or trends related to the selected demographic or experiential charateristics.

In analyzing the open-ended responses to Questions 6 through 8, interesting patterns emerged. Student responses to Question 6 are summarized in Figure 6.

Model Viewed

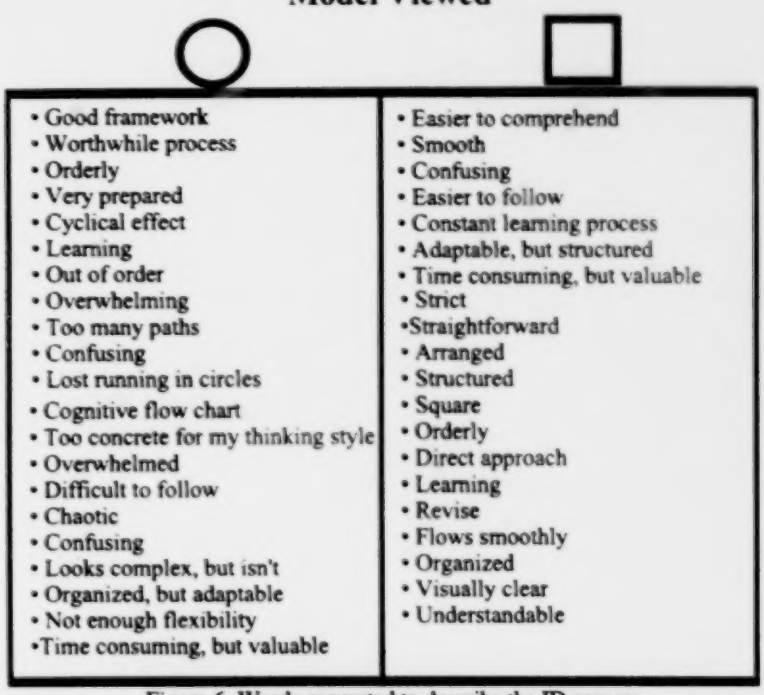

Figure 6. Words generated to describe the ID process

Though data were summarized in a manner to observe any influence caused by the order in which the students viewed the models, presentation order does not appear to influence these responses. Student-generated words used to describe the instructional design process as depicted in the curved/oval model included the terms orderly, confusing, smooth, overwhelming, adaptable but structured, time consuming but valuable, out of order, easier to comprehend, and easier to follow. Quite similarly, student-generated words used to describe the instructional design process as depicted in the straight/rectangle model included the terms orderly, confusing, flows smoothly, overwhelmed, organized but adaptable, time consuming but valuable, chaotic, understandable, and straightforward. Overall, the very same words or those with similar meanings were used to describe both the positive and negative aspects of the instructional design process regardless of whether curved or straight lines were used to visually depict the model. These descriptive words were not necessarily provided by the same students.

In considering Question 7, Figure 7 depicts the number of students who indicated a preference for the curved/oval, the straight/rectangle, or neither model as the best representation of what occurs during the instructional

design process. Descriptive statistics indicate that, of the 36 preservice teachers, 13 students (36%) believed that the curved/oval model best represented the ID process, 14 students (39%) believed that a straight/ rectangular models best did so, and 9 students (25%) believed neither model was better.

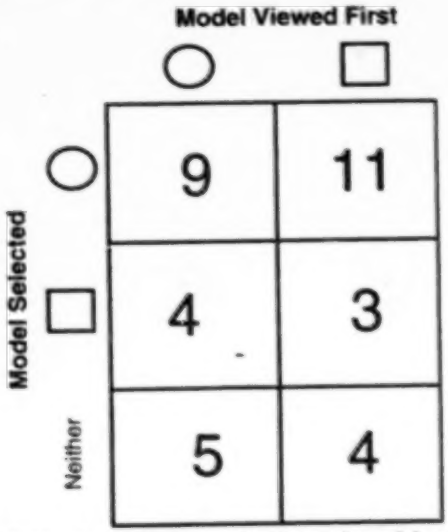

Figure 7. Number of students selecting each model as "best"

When the curved/oval model was viewed first by 18 students, 9 students (50%) indicated that it was the best representation of the ID process, 4 students (22%) indicated that the straight/rectangle model was the best, and 5 students (28%) indicated neither was better. When the straight/rectangle model was viewed first by 18 students, 11 students (61%) indicated that the curved/oval model was the best, 3 students (17%) indicated that the straight/rectangle model was best, and 4 students (22%) indicated that neither was better. Overall, 20 students (56%) indicated that the curved/oval model was the best representation of what happens in the instructional design process, 7 students (19%) indicated that the straight/rectangular model was the best, and 9 (25%) students responded that neither model was a better representation of the ID process.

Data relating to Question 8 above are presented in Figure 8. In a similar manner to the data collected for Question 7, descriptive statistics indicate that of the 36 preservice teachers, 14 students (39%) believed that they would use the curved/oval model to teach the ID process, 13 students (36%) believed that they would use the straight/rectangle model to do so, and 9 students (25%) had no preference for use. When the curved/oval model was viewed first by 18 students, 9 students (50%) indicated that it was the model they would use to teach the ID process, 5 students (28%) indicated that they would use the straight/ rectangle model, and 4 students (22%) responded that they had no preference for use. When the straight/rectangle model was viewed first by 18 students, 11 students (61%) indicated that the curved/oval model was the one they would use to teach, 2 students (11%) indicated that the straight/rectangle model was the one they would use, and 5 students (28%) indicated that they had no preference for use.

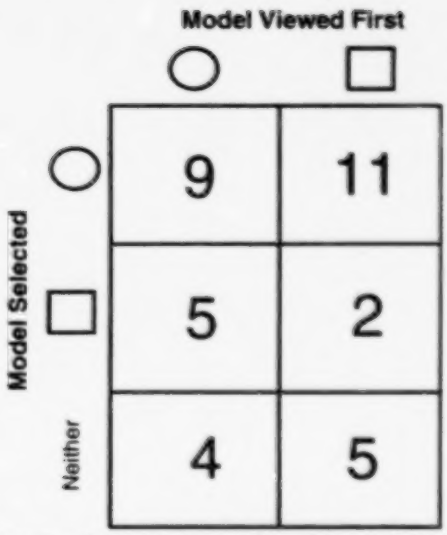

Figure 8. Number of students selecting each model as "choice to use to teach"

With overall data strikingly similar to that of Question 7, 20 students (56%) indicated that the curved/oval model was the model they would use to teach instructional design process, 7 students (19%) indicated that the straight/rectangular model was their choice, and 9 (25%) students responded that they did not have a preference of model to use to teach the ID process to a colleague. Additional data indicate that, though students strongly tended to select the same model as the "best" one and their "choice to use to teach," this was not always the case.

Data displayed in Figures 9 and 10 also provide insight into the students' perceptions of the "best" and "choose to use to teach" models as they provide verbal explanations of their decisions. Again, the order of presentation did not appear to affect the terms chosen to describe student reasoning behind their preferences. As depicted in Figure 9, regardless of whether it was presented first or second, if the curved/oval model was preferred, the most common reasons included that it was more flexible, more modifiable, and more adaptable. Regardless of whether the straight/rectangle model was viewed first or second, it was described as more organized, easier to follow, and easier to understand. No comments were made if students did not perceive one model as better than the other. In a similar manner, results displayed in Figure 10 indicate that the order of presentation did not appear to affect students' choice of words generated to describe their preference of one model or the other that they would chose to use when teaching someone about ID. Whether presented first or second, the curved/oval model was generally perceived as malleable, not as fixed, more flexible, easier to understand, and more flowing. Again regardless of presentation order, the straight/rectangle model was perceived as more organized, more clear, more structured, easier to understand, and easier to follow. Students who selected no model preference indicated that they would integrate the use of both models but did not supply additional words to describe the models.

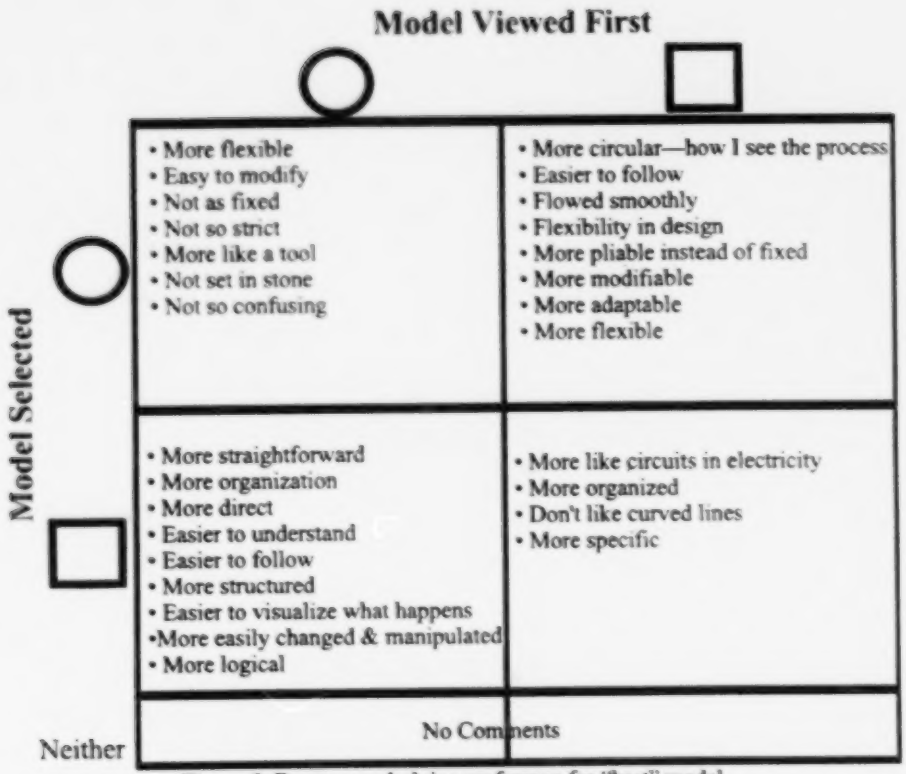

Figure 9. Reasons underlying preference for "best" model

Discussion and Recommendations

Regarding Question 1, data indicate that preservice teachers changed their responses between the pretest and posttest assessing their perceptions of the flexibility, organization, and value of the ID process. Students' perceived the ID process as more flexible, more organized, and more valuable/useful after the instructional intervention. Student indications that ID was perceived as *sensible* and *valuable* comfort the researchers, who believe that the ID process indeed is worthwhile to teach to these preservice teachers.

Questions 2, 3, and 4 may be affected by the order in which students viewed the model, but evidence that they perceived the straight/rectangle model to be more organized was highly significant (.01 level). Students who viewed the curved/oval model second responded significantly (.05 level) that it was the more flexible model. This perception of greater flexibility is also supported by responses to the open-ended questions. Conversations with Jerrold Kemp (personal communication, February 17, 1996) provide additional insight into this observation. Kemp suggests that straight/rectangle models may provide novice instructional designers with valuable structure and organization while more mature instructional designers appreciate the flexibility represented in curved/oval models. This is an avenue for further investigation.

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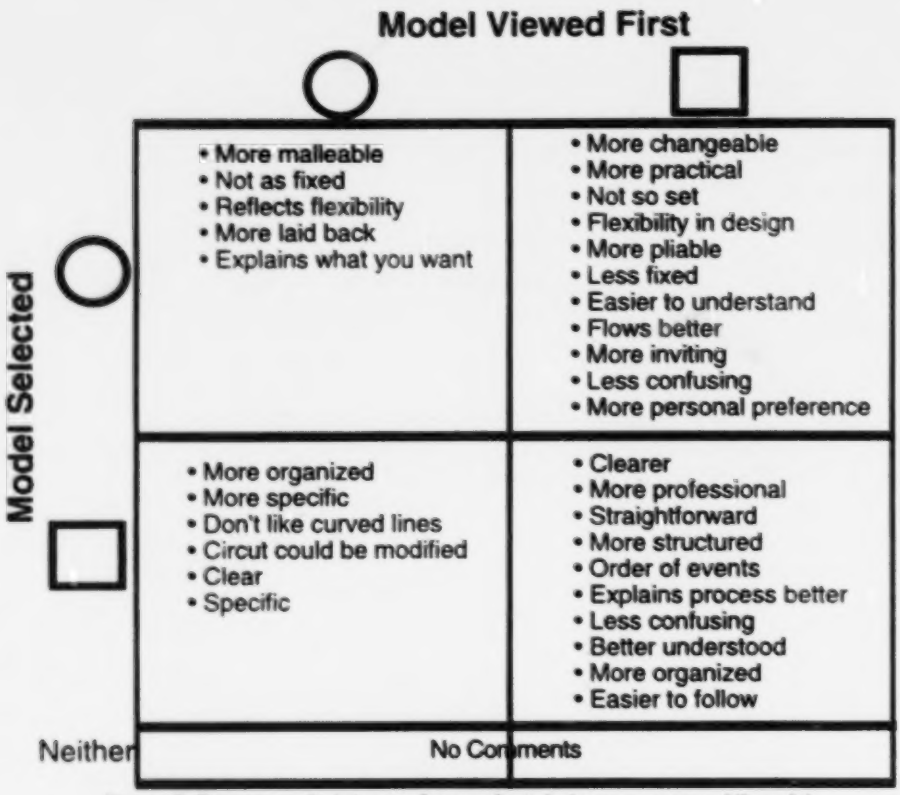

Figure 9. Reasons underlying preference for "choice to use to teach" model

In considering Question 5, open-ended responses indicate that the demographic and experiential characteristics of the students that were selected for this study may not be as influential in determining student preferences as other factors not yet investigated. Among some of the additional characteristics possibly influencing preservice teachers' perception of the ID process itself and the way in which it is visually depicted include individual learning style preferences; cognitive style factors such as locus of control and field dependence/independence; educational background such as electrical engineering training or experience in reading other types of flowcharts; individual preference for structure or flexibility; and personal visual appeal. In conjunction with data collected to address Question 6, this observation is supported by the similarity between the words students consistently generated to describe both the curved/oval model and the straight/rectangle model and the ID process itself. Apparently, student characteristics other than those identified have a greater impact on their perceptions of the ID process and the visual representation of the model, and this is an area for continued investigation.

With regard to Questions 7 and 8, a majority of students (56% in each case) indicated a preference for the curved/oval model as the "best model to represent the ID process" and as the "choice of model to use to teach the ID process." However, data do not indicate why this preference exists, particularly when a statistically significant number of students indicated that the straight/rectangle model was more organized. This is another area in which further investigation is being conducted.

The importance of the visual display of ID models for professionals teaching the instructional design process is summarized by two very different quotations from two sophomore students, both of whom had no preference for a "best" or "choice to use to teach" model. One student lamented: "I understand the presentation that you gave and it was very helpful . . . but I don't get these dang models!" This comment underscores the importance of presenting a visual representation of the ID process that facilitates—not hinders—students' acquisition of the principles underlying the instructional design process. Numerous comments also could be cited to support the observation of students' preferences of models based on their own personal preferences for structure or flexibility. However, one very astute student concluded: "The only difference is the lines as far as I could see. To me lines that are curved or lines that are straight

still point to the same thing. . . . Curved lines may indicate flexibility & straight lines more structure & less variance. I look at the design as both flexible & structured." Since this is one of the key messages regarding the instructional design process that the researchers attempt to convey to preservice teachers, perhaps preservice teachers should be introduced to both curved/oval and straight/rectangle visualizations of the ID process. This study has generated more questions than it has answered, and the question of the impact and importance of the visual display of an ID model on student perceptions of the process itself remains a viable area for additional research.

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